

XXVII. *On some Petrels from the North-East Pacific Ocean.*

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(Text-figure 9.)

WHILE the senior author was dealing with the Petrels of Australia in the 'Birds of Australia' (vol. ii. 1912) he received a small collection of these birds from Mr. Alan Owston. The few skins received were of such great interest that more material was demanded. A second small lot arrived, but repeated requests have met with no further response. We now feel compelled to put on record the facts in connection with these few birds, as they indicate great discoveries and confirm our anticipations as to the home of some of our supposed wandering birds.

In the work quoted Mathews wrote (p. 1): "I also anticipate that, when this group is studied by means of breeding birds, it will be found that they are not the great wanderers they have hitherto been considered, but that the majority pass their time quite close to the breeding ground."

This statement was made in opposition to the views put forward by Godman in the 'Monograph of Petrels,' which may be crystallised in such a statement as appears on p. 28: "It would not be surprising to learn that a species of Petrel which summers in Japan should be found in winter off the coasts of Peru." That Godman's views were upheld by British ornithologists generally is easily seen by the admission into the British list of a bird breeding at the Kermadec Islands. Though one of us has denied the identity of the "British" specimen, this view has not been upheld by some British workers. The discoveries recorded in this paper would amply confirm Iredale's suggestion as to the occurrence of such birds in the Atlantic Ocean.

The most amazing result of our investigation is our proved inability to accurately name such a small collection as here discussed without practically re-monographing the genera represented. When we undertook the task it seemed simple,

as we had so recently thoroughly dealt with all the species inhabiting Australia and New Zealand, and little trouble was anticipated. Our experience has convinced us that the usual method of reporting upon large collections is comparatively valueless, and the paper by Claude Grant in the January 'Ibis' is a good instance of the new method necessary. That worker finds that a monograph of each species must be prepared; had he only tackled the genera as well as the species it would have been a perfect example of up-to-date work. This latter detail has up to the present been ignored, yet, in our opinion, it is as necessary as the determination of subspecies. As a matter of fact we consider it the more important, and we anticipate in the future it will occupy a more prominent place than it does at present.

It would seem most profitable to systematically deal with the specimens under notice and then review the additional knowledge and indicate our conclusions.

Since the 'Birds of Australia' was published a very useful summary of the distribution of the Tubinares in the North Atlantic Ocean by D. A. Bannerman has appeared in the 'Ibis' for July 1914, pp. 438-494. Bannerman has confirmed the suggestion that these birds were local in their distribution and has observed (p. 442): "In all the comprehensive works dealing with 'Petrels' which have appeared, I can find no attempt at an explanation of the present geographical distribution which many species enjoy." In this paper we will show that our knowledge is much too imperfect to admit of conjecture in this direction, and it is well that such has been up to the present withheld.

In the 'Birds of Australia' the four families recognised by Salvin in the twenty-fifth volume of the 'Catalogue of Birds in the British Museum,' and upheld by Godman in the 'Monograph of Petrels,' were maintained, though the constitution of some of the subfamilies was questioned. We herewith discuss these in view of the fuller knowledge of the group we now possess.

Family HYDROBATIDÆ.

This name was used for the family Procellariidæ of the 'Monograph,' as the oldest genus name in the family was *Hydrobates*, which was not considered invalidated by the prior introduction of *Hydrobata*. Up to the present time no recognition of unanimity with regard to such a question is possible, as though American ornithologists consistently reject such similarly constituted names, British workers are divided in their methods: some consistently accepting such names as different and valid in each case, while others, and these are in the majority, consistently decide as to the acceptance or rejection of these disputed names, according to sentimental conclusions. Under the present conditions *Hydrobates* would be rejected by American workers and some British ones, while other British writers would use *Hydrobata*. Personally, the endings *-es* and *-a* do not seem sufficiently distinct for acceptance, but as we have not to use the name save in a family sense, we make no alteration. This is a question, however, which should be definitely settled, and then the ruling rigidly carried out one way or the other. At the present time a large number of names persist in this unsettled state, and this is not good for general workers as it causes much confusion.

This family was divided into two subfamilies, *Procellariinæ*=*Hydrobatinæ*, and *Oceanitinæ*. Only members of the latter occur in Austral waters, and consequently the species of the former have not previously been individually studied by us. The attempt to name one member has shown that there is much confusion, and we put on record our results for the benefit of future workers in this group.

Genus CYMOCHOREA Coues.

Cymochorea Coues, Proc. Acad. Nat. Sci. Philad. 1864, p. 75.

Type by original designation: *Procellaria leucorhoa* Vieillot.

The acceptance of this generic name has been made

necessary by a study of the family, and we hope the following points will receive careful attention.

In the classification given in the 'Monograph of Petrels,' which is copied from the Cat. Birds Brit. Mus. vol. xxv., as there acknowledged, p. xxxiv, the subfamily is divided as follows :—

- "a. Tarsus longer than the middle toe and claw ;
tail not distinctly forked.
- a'. Tail rounded or nearly even..... *Procellaria*.
- b'. Tail wedge-shaped *Halocyptena*.
- b. Tarsus not distinctly longer than the middle
toe and claw ; tail perceptibly forked *Oceanodroma*."

As a synonym of "*Oceanodroma* Reichenbach (Syst. Av. p. iv, 1852. Type, *O. furcata*)" was included "*Cymochorea* Cones, Pr. Acad. Nat. Sci. Philad. 1864, p. 75. Type, *O. leucorrhoa*."

The species included under the generic diagnoses given do not agree with those as regards *Procellaria* and *Oceanodroma* ; details will be given later. As long ago as 1899, dealing with the Birds of the Galapagos Islands in the Nov. Zool. vol. vi. p. 199, Messrs. Rothschild and Hartert wrote :

"Genus *Procellaria* L.

(The genera *Procellaria*, *Halocyptena*, and *Oceanodroma* are so closely allied that they hardly require generic separation, but the characters mentioned in Cat. B. Brit. Mus. xxv. p. 343, can serve to distinguish them)."

This was followed by the record of "*Procellaria tethys* Bp." On the preceding page they had admitted "*Oceanodroma* Reichb." with a species "*Oceanodroma cryptoleucura* (Ridgw.)."

In the same journal, vol. ix. pp. 415/416, the same nomination was adhered to and an additional species, *Oceanodroma kaedingi* Anthony, catalogued.

Before criticising this classification we would note that in the 'Hand-list of British Birds,' by Hartert, Jourdain, Ticehurst, and Witherby, 1912, pp. 149-150, *Hydrobates pelagicus* (L.), *Oceanodroma leucorhoa* (Vicill.), and

Oceanodroma castro (Harcourt) (= *cryptoleucura* Ridgway), appear, so that we are not exactly dealing with ancient history.

We are emphasizing this as we contend that "lumping" of genera induces carelessness in the critical examination of birds as well as obscures alliances and confuses convergence with relationship, and we are here furnished with a beautiful example. We will discuss it in detail further on, but we would here justify our remarks by stating that *Procellaria tethys* has the tail "distinctly forked," while *Oceanodroma castro* or *cryptoleucura* has the tail not perceptibly forked. Yet Rothschild and Hartert, after examining both these birds, deliberately wrote that the characters given as above in the Catalogue of Birds "can serve to distinguish them." Had these workers been genus-splitters such a statement would not have been made, as careful examination of the birds to ascertain if differences existed would have enabled them to detect the inaccuracies present in the key.

The whole of the members of the subfamily admitted in the 'Monograph' read:—

Procellaria pelagica Linn., *P. tethys* Bp.

Halocyptena microsoma Coues.

Oceanodroma leucorhoa (Vieill.), *O. beali* Emerson, *O. beldingi* Emerson, *O. kaedingi* Anthony, *O. castro* (Harcourt), *O. macrodactyla* Bryant, *O. tristrami* Stejneger, *O. melania* (Bp.), *O. markhami* (Salvin), *O. homochroa* (Coues), *O. monorhis* (Swinhoe), *O. hornbyi* (Gray), and *O. furcata* (Gm.).

In the American Ornithologists' Union's Check-list, 3rd ed. 1910, pp. 56-57, we have the following improvement as regards *Oceanodroma*:—*Oceanodroma*, subgen. s. s., sole species *furcata* Gm.; subgen. *Cymochorea* Coues, with species *O. kaedingi* Anthony, *leucorhoa* (Vieillot), *macrodactyla* Bryant, *castro* (Harcourt), *melania* (Bonaparte), *homochroa* (Coues), and *socorroensis* Townsend.

It will be seen that the only American species left in the typical subgenus of *Oceanodroma* is the type, all the others being classed under *Cymochorea*, but only subgenerically.

Our examination of all these birds causes us to differ both as regards the genera and subspecies to be recognised. Neither of the two works quoted admit subspecies at all, the 'Monograph' doubting the validity of some of the forms which in the 'Check-list' are admitted as species.

To deal with the genera first. In the 'Monograph' *Procellaria*=*Hydrobates*=*Thalassidroma* of the American 'Check-list' is diagnosed as above by means of the proportion of the tarsus to the middle claw and toe and presence or absence of a fork in the tail-feathers. Neither of these characters holds good in the species assembled under the genus, for the second species, *tethys* Bp., has the tail forked. This species is small like *H. pelagica*, but otherwise is a somewhat typical *Cymochorea*. Its removal would leave *pelagica* as the sole representative of *Procellaria* auct. = *Hydrobates*=*Thalassidroma*.

Oceanodroma should be restricted to the typical species *O. furcata* Gmelin, as though structurally there is little differentiation between the genotype and other species of *Cymochorea*, yet, as Coues pointed out, it possesses a radically different style of coloration. There is practically no difference in the coloration of species of *Hydrobates*, *Halocyptena*, and *Cymochorea*, though structurally there is considerable variation. The first-named is a very small bird, with a square tail and very short legs and feet; the second is even smaller, with more delicate legs and feet, but has developed a wedge-shaped tail. The last-named has, if *castro* be included, evolved from a somewhat small bird with a tail emarginate only, to a rather large one with a long-forked tail, while it has only diminished in size though also showing a fork in the tail in the case of *tethys* Bp. The only break in the uniform darkness of the coloration of all these species is the presence of a white rump in some cases.

In the four genera here indicated the wing formula is the same, viz., the second primary longest, the third very little shorter, the first and fourth subequal. The tarsus is covered with reticulate scales throughout, and the toes have sharp narrow, not flattened, claws.

It should be observed that the figure of *Procellaria tethys* Bp. in the Monograph shows a square tail; this is wrong, and though the specimen from which the plate was prepared is in poor condition and there is a good excuse for the artist so drawing it, Salvin wrote, from examination of the same skin, that the tail was forked.

The tail in "*Oceanodroma*" *castro* is not "perceptibly" or, as written in the 'Catalogue,' "distinctly" forked. At the best it would be described as "emarginate," while some specimens show little emargination even. Further, the tarsus is distinctly longer than the middle toe and claw, so that if the definitions in the 'Monograph' or 'Catalogue' were of any value *it would be a typical Procellaria=Hydrobates=Thalassidroma*.

Nevertheless we conclude that phylogenetically it is a *Cymochorea*.

When Coues separated *Cymochorea* and restricted *Oceanodroma* to *furcata* he included with that species *hornbyi* Gray. This bird was unknown to him save by description, and he followed Bonaparte, though remarking upon the different coloration. The type-specimen is still *unique* and is one of the most puzzling Petrels we have seen. It differs absolutely in coloration from *Oceanodroma* or the dusky Petrels of the *Hydrobates-Halocyptena-Cymochorea*-group. It recalls to us a similar anomalous form from the south, *Pelagodroma marina* Latham. In this case structural differences are co-existent with the strange coloration, and consequently the genus *Pelagodroma* is recognised by all workers. The species *hornbyi* has just as distinctive coloration, and as it does not correlate at all with any of the other members of the family, we propose for it the generic name

BANNERMANIA, gen. nov.

We would point out that the unique specimen differs in wing formula, having the second primary noticeably the longest, the first equal to the third and much longer than the fourth. The value of this from one specimen alone we cannot exactly gauge: the skin has been unmounted, and

we cannot exactly determine the proportion of the tarsus to the middle toe and claw, but the tarsus seems longest.

We would then recognise five genera, *Hydrobates*, *Halocyptena*, *Cymochorea*, *Oceanodroma*, and *Bannermania*. The first three agree in coloration and structure and are closely allied, the last two resemble these in structure but show a great discord in coloration and have probably little direct relationship. To put it in other words, we would give the difference in coloration present more value than the difference in structure observed, or we would consider *Halocyptena* more closely allied to *Cymochorea* than *Oceanodroma* is to that genus.

We would then recognise :—

Genus *Hydrobates*

Sole species *Hydrobates pelagica* (L.).

Genus *Halocyptena* Coues.

Sole species *Halocyptena microsoma* Coues.

Genus *Cymochorea* Coues.

Species *Cymochorea leucorhoa* (Vieillot) & subsp.

„ *castro* (Harcourt) & subsp.

„ *monorhis* (Swinhoe) & subsp.

„ *homochroa* (Coues).

„ *macrodactyla* (Bryant).

„ *melania* (Bonaparte).

„ *markhami* (Salvin).

„ *owstoni*, n. sp.

Genus *Oceanodroma* Reichenbach.

Sole species *Oceanodroma furcata* (Gmelin).

Genus *Bannermania* Mathews & Iredale.

Sole species *Bannermania hornbyi* (Gray).

The names missing from the above list are *O. beali* Emerson, *O. beldingi* Emerson, *O. kaedingi* Anthony, and *O. tristrani* Salvin. All these have been referred to *Cymochorea*, but we are quite unable to determine the first three, while the last is specially dealt with later.

When Emerson (Condor, viii. 1906, pp. 53-55) introduced his two forms he gave us numerals indicating the

differences. If his forms are no better than his numbers then they must be poor indeed, for his data are too confused to be at all intelligible. When a writer gives as his average measurements figures larger than his largest example, and then, to show there is no prejudice, in the next case gives as an average a figure smaller than his least, nothing can be done. We thought simply a misplacement had taken place, and this is observed to be the case in one instance, but altogether it is impossible to determine the truth. Consequently no reliance can be placed upon any measurements given in this paper, and until confirmation by some one able to exactly record measurements accurately taken, and *see that they are printed correctly*, Emerson's forms must remain obscure to the worker unable to examine topotypes. Emerson has in the same place brought into this confusion Anthony's *O. kaedingi*, so that we have left it alone. We do not mean to disparage Anthony's species, but we fear to add to the confusion.

O. socorroensis Townsend we should class as a subspecies of Swinhoe's *monorhis*. It is difficult to separate them, and they were lumped in the 'Monograph.'

In that work *C. homochroa* Coues is called the Ashy Petrel and this vernacular name is used in the A. O. U. Check-List. We are unable to see any reason for this, as the bird is no different in coloration to any other. In the 'Monograph' it is stated to be lighter than *C. monorhis*, but we are quite unable to appreciate this distinction. To our eyes the specimens seem *darker* than the type of *C. monorhis* Swinhoe.

The generic character of *Oceanodroma* of the 'Monograph' has been above given, and we have already indicated that *O. castro* does not well agree with the tail character, the fork being almost imperceptible, while the tarsus is certainly distinctly longer than the middle toe and claw.

In one of the large species, *O. melania* Bonaparte, the feet are strong and large and the tarsus is distinctly longer than the middle toe and claw, though the tail is long and forked.

It may be noted that in some of the species of *Cymochorea* the legs and feet are comparatively strong and in others they

are delicate and weak, and this discrepancy is seen in birds of similar size.

Since writing the preceding we have referred to the 'Water Birds of North America,' by Baird, Brewer, and Ridgway. This work seems to us to reach the highwater-mark of excellence as regards the systematic portion. In it we find the genera *Halocyptena*, *Procellaria* (= *Hydrobates*), *Cymochorea*, and *Oceanodroma* recognised, with beautiful coloured figures of the heads and sketches of the bills, tails, and legs, together with careful diagnoses of the genera. The few errors apparent are due to lack of material. The species *hornbyi* is placed in *Oceanodroma*, as no specimen was accessible. We feel sure, had such been available, we would have been anticipated in its generic separation.

We will now describe as new a Petrel from the north-east Pacific.

Cymochorea owstoni, n. sp.

Adult male. Head, throat, and neck all round dark plumbeous ashy, a small ante-ocular patch darker; the back, scapulars, and rump are practically the same shade. A paler brownish patch is seen on the upper tail-coverts, due to the exposure of these feathers, the tips only being dark, the remainder pale brownish, the concealed bases being quite light. The tail-feathers and primaries are brownish black, the inner webs of the latter being paler brownish. The greater wing-coverts are very pale brownish, forming a distinct bar which is continued on to the bend of the wing, the lesser coverts being also very pale. From the lower neck to the under tail-coverts a uniform sooty-brown coloration prevails, the inner wing-lining being of this colour. The axillaries apparently are dark ashy grey. No soft parts are noted; but the bill is black and the legs dark brown, judging from the skin. Culmen 19 mm.; wing 184; outer tail-feathers 100; central tail-feathers 68.5; tarsus 28.5; middle toe 27.

Type, with data "1/5/02, ♂, Okinose, Sagami Sea," = Yokohama bay, Japan, in Coll. G. M. Mathews.

A second specimen, with data "Okinose, Sagami Sea, ♂,

May '02, *Oceanodroma tristrami* Salvin?," measures :— Culmen 19 mm. ; wing 182 ; outer tail-feathers 103 ; middle tail-feathers 70 ; tarsus 29·5 ; middle toe 26. In this bird the coloration of the head, neck, and back is darker (? due to oil), while the upper tail-covert patch of brown is lighter and more noticeable and the light wing-bar more pronounced.

This bird agrees very well in coloration and size with *O. markhami* Salvin, but is at once separated by the difference in the structure of the feet. In our bird the tarsus is heavy and the toes stout and long, while *O. markhami* has proportionately small and delicate legs and feet.

In the ' Monograph of Petrels ' *O. tristrami* Stejneger is maintained, though the type was stated to be lost. This species was described by Salvin in the Cat. Birds Brit. Mus. vol. xxv. 1896, p. 354, the name used being a manuscript one of Stejneger. The description given is generally applicable to any of this group, but the measurements read : "Wing 6·20 ; tail 3·78, forked for 1·60 ; culmen 0·70, depth of bill through middle 0·20 ; tarsus 1·10 ; middle toe with claw 1·12 in." The locality was "Sendai Bay, Japan" ; and Salvin notes it may have been immature, as the primaries were not fully grown.

In view of the discoveries of American ornithologists with regard to birds of this genus, the discrepancies in the measurements are too great to be minimised. This, in connection with the fact that the type is lost, necessitates the rejection of the name in this connection ; and after studying this group, we suggest that the only method of identifying *O. tristrami* will be by means of specimens from Sendai Bay itself. Until a series from that locality is procured, the name should be regarded as indeterminable.

Family PUFFINIDÆ.

In the ' Birds of Australia,' vol. ii. 1912, p. 130, Mathews drew attention to the great distinction between the bills of the downy young of birds of the genera *Puffinus* and *Pterodroma*, and illustrated the differences with a figure. He continued the subfamily separation made in the ' Monograph,' and suggested that *Procellaria* (= *Majaqueus* anct.)

might prove to be a Puffinoid bird. Examination of a series of juvenile Petrels from New Zealand in the Vienna Museum collected by Reischek, enabled Iredale (Austral Av. Rec. vol. ii. 1913, pp. 17-24) to record some interesting data, and we now incorporate our most recent investigations in connection with these birds in the present review.

Mathews (*loc. cit.* p. 45) included *Puffinus* as used in the 'Monograph' and Cat. Birds Brit. Mus. vol. xxv.; on p. 129 *Pterodroma* displaced *Astelata* on the score of priority, the association of species being preserved.

Since then both of us have broken up these genera, and we add a further separation in this place. Now we would indicate the genera admitted and the species allotted to them, dealing with the old genus *Puffinus* first.

This genus, founded upon *Procellaria puffinus* Brünnich, has been enlarged to include all species having a similar or dissimilar bill which had "the look of a *Puffinus*." Neither structure nor colour-pattern has been adhered to, but a somewhat quaint rule-of-thumb process has become universal. If the bill of *P. puffinus* be compared with that of *P. kuhlii*, the difference observed is immense. If *P. kuhlii* be now contrasted with *Procellaria aequinoctialis* Linné, a much greater resemblance will be seen; yet these are placed in different genera. Mathews pointed out that the subfamilies recognised in the 'Monograph' were untenable; and we now emphasize the fact that the generic diagnoses provided in that work are as incorrect in connection with this group as we have shown them to be in connection with the preceding. Thus (p. xxxix) in the generic key we get:—

- "a. Tarsi distinctly compressed, the anterior edge sharp.
 - a'. Nasal tube flat, both apertures visible from above, directed forwards and slightly upwards; rectrices twelve in number *Puffinus*.
 - b. Tarsi not compressed, more rounded on the anterior edge; rectrices twelve in number.
 - c''. Bill long, stout, mostly yellow in colour; unguis large; nasal tube directed forwards; claw of hallux small *Majaqucus*."

If the typical species of *Puffinus* be compared with typical *Majaqueus*=*Procellaria*, the differences will be seen to be very great and not emphasized sufficiently by the diagnoses given, though the compression of the tarsus is almost as much in *Majaqueus*=*Procellaria* as in *Puffinus*. If *Puffinus kuhlii* be now placed between these two, in the main features it will be seen to be much closer to *Procellaria* than to *Puffinus*: the bill is longer but agrees closely with that of *Procellaria*; the tarsus is, however, not so compressed as in *Procellaria* and obviously differs from the flattened tarsus of *Puffinus* s. str., while the anterior edge is *not* sharp.

If *Puffinus leucomelas* be examined, discord with typical *Puffinus* is also seen as elaborated below. The species *Puffinus carneipes* Gould differs at sight in its peculiar bill, and from a study of the nestling stage Iredale separated it under the generic name *Hemipuffinus*.

Consideration of the other species of "*Puffinus*" caused Mathews, in the 'Birds of Australia,' to list the Australian forms in this manner:—

Genus *Puffinus* Brisson.

Puffinus assimilis Gould.

Genus *Reinholdia* Mathews.

Reinholdia reinholdi (Mathews).

Genus *Thyellodroma* Stejneger.

Thyellodroma pacifica (Gmelin).

Genus *Hemipuffinus* Iredale.

Hemipuffinus carneipes (Gould).

Genus *Neonectris* Mathews.

Neonectris griseus (Gmelin).

„ *tenuirostris* (Temminck).

Genus *Ardenna* Reichenbach.

Ardenna leucomelas (Temminck).

In the present collection there are representatives of the genera *Puffinus*, *Thyellodroma*, *Neonectris*, and *Puffinus leucomelas*. This necessitated the reconsideration of the

genera utilised by Mathews, and we now go more into detail with regard to the relationships of the species. All the species are uniform above and below or white below, save *P. leucomelas* which has the head curiously streaked. For this species we are providing a new generic name. Colour considerations alone would suggest its separation from the remainder of the group. It will be discussed in detail later, so we would generally note the distribution of these genera and species and draw attention to some interesting facts.

Beebe has recently divided the Pheasants into many genera, concluding *that no two species of the same genus inhabit the same territory*. We welcome such a revolutionary conclusion with gratitude, as the study of sea-birds has enforced this fact upon us, but we should not have dared to put this before the ornithological world in the deliberate manner Beebe has done. Now that Beebe has opened this matter, we put forward our proposals with confidence. We will use the name "*Puffinus*" in the sense of the 'Monograph,' and note that it is really what Beebe calls a supergenus. We are, and have been, continuing investigations with regard to the supergenera of birds, and would scarcely regard "*Puffinus*" of the 'Monograph' as a homogeneous supergenus, but for the present it can be so considered. We will only use species-names here.

On the Kermadecs live :

<i>Puffinus pacificus.</i>	Genus <i>Thyellodroma.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>

On Lord Howe Island live :

<i>Puffinus pacificus.</i>	Genus <i>Thyellodroma.</i>
<i>carneipes.</i>	<i>Hemipuffinus.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>

On Norfolk Island live :

<i>Puffinus pacificus.</i>	Genus <i>Thyellodroma.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>

In New Zealand live :

<i>Puffinus griseus.</i>	Genus <i>Neonectris.</i>
<i>carneipes.</i>	<i>Hemipuffinus.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>
<i>reinholdi.</i>	<i>Reinholdia.</i>

In East Australia live :

<i>Puffinus pacificus.</i>	Genus <i>Thyellodroma.</i>
<i>reinholdi.</i>	<i>Reinholdia.</i>

In West Australia live :

<i>Puffinus pacificus.</i>	Genus <i>Thyellodroma</i>
<i>carneipes.</i>	<i>Hemipuffinus.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>

From Bannerman's paper (Ibis, 1914) we find a similar distribution of birds in the North Atlantic. From the table on p. 443 we note that from the Azores, Madeira, Desertas, Porto Santo, Salvages, and Canary Islands breeding-records cover

<i>Puffinus kuhli.</i>	Genus <i>Calonectris.</i>
<i>puffinus.</i>	<i>Puffinus.</i>
<i>assimilis.</i>	<i>Alphapuffinus.</i>

While from the Cape Verde Islands are recorded

<i>Puffinus kuhli.</i>	Genus <i>Calonectris.</i>
<i>therminieri.</i>	<i>Alphapuffinus.</i>

In the present collection we have breeding at the Pescadores Islands, between Formosa and the mainland :

<i>Puffinus leucomelas.</i>	Genus <i>Calonectris.</i>
<i>griseus.</i>	<i>Neonectris.</i>
<i>cuneatus.</i>	<i>Thyellodroma.</i>

While from the Bonin Group we have :

<i>Puffinus cuneatus.</i>	Genus <i>Thyellodroma.</i>
<i>bannermani.</i>	<i>Puffinus.</i>

It might be argued that what we have here considered genera are only species ; we would note, however, that there are other species belonging to most of the genera, and where

there are none at present known it would be very unwise to dogmatise, as the few birds here studied upset most of the theories advanced by previous workers while enlarging our ignorance (we had nearly written knowledge) of the breeding-habits of these birds beyond previous anticipation.

Before going any further, we might indicate the greatest discovery in connection with this collection. In the American Ornithologists' Union Check-List, 3rd ed. 1910, p. 53, we have given as the range of

Puffinus griseus (Gmelin) :

"Oceans of Southern Hemisphere : occurs in summer on the Pacific coast from southern Alaska to Lower California, and on the Atlantic coast from the Gulf of St. Lawrence to South Carolina : accidental in Alabama : *probably breeds in the South Pacific.*"

And on p. 54 :—

Puffinus tenuirostris (Temminck) :

"Breeds in Southern Hemisphere : migrates north along both coasts of the North Pacific to Kotzebue Sound, Alaska."

Puffinus cuneatus Salvin :

"North Pacific Ocean. Breeds on Hawaiian Islands, and islands off the coast of western Mexico : occurs in migration north to Bonin Islands, and Lower California."

In the 'Birds of Australia,' vol. ii. p. 98, Mathews noted : "This name (*chilensis* Bonaparte) must be accepted at the present time in preference of *N. amaurosoma* Coues (1864, p. 124), though later this latter name may have to be used for a north Pacific breeding-form (of *P. griseus*), the types of Coues's species having been obtained at Cape St. Lucas, Lower California. I am not at all certain that the birds met with in such numbers at the extremity of South America are the same as those which occur off the coast of California. There always seem to be discrepancies in the dates that need adjustment, and the recent discoveries of Petrels breeding in the north Pacific seem to point to many yet to be made."

On p. 103, with regard to *P. tenuirostris brevicaudus*, this point of view was again emphasized.

At that time Mathews was in receipt of the first consignment from Owston; but the second amply confirmed his conclusion, for it contained a form of *Puffinus griseus* breeding on the Pescadores Islands—a new record for the east Pacific Ocean, and a new breeding record for the north Pacific Ocean, because previously the only breeding places known of this species were in the south of New Zealand.

On the same group, the Pescadores, *P. leucomelas* and *P. cuneatus* were procured; while *P. cuneatus* was proved to breed on the Bonin group, and another form of *P. griseus* was received from the Kuril Islands.

Consequently it must now be admitted that all the species recorded from the north Pacific Ocean breed there, and thus a field for investigation is indicated, the fruits of which cannot be anticipated.

The next most important discovery is the receipt from the Bonin Islands of a new species of *Puffinus*, intermediate between *P. opisthomelas* Coues (= *auricularis* Townsend) from the coast of California and *P. newelli* Henshaw from the Hawaiian group. It is a distinct species, but these are its nearest allies, and as *P. newelli* Henshaw is almost extinct, it is a most interesting addition to the group of the true *Puffinus*. These discoveries suggest that a careful search of every rocky islet in the north Pacific may bring to light just as unexpected forms, and that no dogmatic conclusions regarding the distribution of Petrels can yet be attempted.

We would emphasize how coloration may be a generic character, or even supergeneric, in connection with *Puffinus* and *Pterodroma*.

These two genera were long distinguished by their appearance, there being little structural difference to grasp; yet when once one of the species of the former genus was examined and compared with one of those of the latter, all the species could be easily separated into these two groups, though variation in coloration, form, and size was

commonly observed. It was almost impossible to write down the differences, and practically no one has attempted to do so. Neither Coues nor Ridgway were as happy in their diagnoses in connection with these as with most groups, yet their association of the species was correct.

Neither Salvin nor Godman attempted any generic diagnosis, the keys given being inaccurate when the species were examined. Yet by means of colour and form these groups can be separated, and that they are very distinct groups is proved by study of the nestlings, as was first shown by Mathews.

Pterodroma always has a black bill; *Puffinus* never has, though sometimes almost a unicolorous bill. The main difference, and one which is quite diagnostic, is in the colour of the legs and feet.

In *Pterodroma* the feet may be black: we note this first, as it is a very rare occurrence and principally when the bird is very dark and unicolor. Even then, the majority of birds show bicoloured feet. *The distribution of colour in the feet forms a generic or supergeneric feature. The tarsus and the proximal joint of the toes is wholly light-coloured, the remainder being dark.* This is easily seen in skins, and most figures show it.

Puffinus never has the legs and feet black, but always more or less bicoloured. *The distribution of colour in the feet forms a generic or subgeneric feature. The outside of the tarsus and the outer toe are always dark when compared with the inside and inner toes.* In the majority of cases this is very prominently seen, the outside being blue-black and the inside yellow. In both cases nestlings in down show these diverse styles of leg and feet coloration.

The genus *Puffinus* covers, in the 'Monograph of Petrels,' twenty-five species, as follows:—*P. leucomelas* (Temm.), *cuneatus* Salvin, *bulleri* Salvin, *chlororhynchus* Less. (= *pacificus* (Gmelin)), *gravis* (O'Reilly), *kuhli* (Boie), *edwardsi* Oustalet, *creatopus* Coues, *anglorum* (Kuhl) (= *puffinus* Brünnich), *yellkouanus* Acerbi, *opisthomelas* Coues (= *couesi* Mathews), *auricularis* Townsend (= *opisthomelas*

Coues), *newelli* Henshaw, *subularis* Ridgway, *gavia* Forster (= *reinholdi* Mathews), *persicus* Hume, *obscurus* Gm. (= *lherminieri* Lesson), *auduboni* Finsch, *assimilis* Gould, *elegans* Giglioli & Salvadori, *bailloni* Bp. (= *baroli* Bp.), *carneipes* Gould, *griseus* Gmel., *tenuirostris* Temm., and *nativitatis* Streets. The first-named has a peculiar style of coloration; but all the rest are either uniform above and white below, or uniform above and below.

Our classification would read :—

Genus *Calonectris*, nov.

leucomelas (Temminck).

kuhli (Boie).

Genus *Ardenna* Reichenbach.

gravis (O'Reilly).

creatopa (Coues).

Genus *Puffinus* Brisson.

puffinus (Brünnich).

couesi Mathews.

opisthomelas Coues.

newelli Henshaw.

nativitatis Streets.

Reinholdia Mathews.

reinholdi (Mathews).

Alphapuffinus Mathews.

assimilis (Gould).

lherminieri (Lesson).

persicus (Hume).

Hemipuffinus Iredale.

carneipes (Gould).

Thyellodroma Stejneger.

pacifica (Gmelin).

cuneata (Salvin).

bulleri (Salvin).

Neonectris Mathews.

tenuirostris (Temminck).

griseus (Gmelin).

We consider *edwardsi* Oustalet a subspecies of *kuhli*, *yelkouan* Acerbi a subspecies of *puffinus*, *subalaris* Ridgway and *auduboni* Finsch subspecies of *lherminieri*, and *elegans* G. & S. and *bailloni* Bp. subspecies of *assimilis* Gould.

The relations of the genera seem to be ill-defined: *Calonectris* and *Ardenna* stand quite apart from all the rest with regard to size and form and to some extent coloration also; while though the lateral compression of the tarsus of species of *Ardenna* is as much as in any other member of the group, and this lateral compression of the tarsus is almost a supergeneric character, *Calonectris* differs in this feature. Consequently we cannot state that these two genera are as closely allied as a superficial examination suggests. Neither would we be justified in allying them to any other genus. There is a huge gap between them and *Puffinus*, and they approach *Procellaria* (= *Majaqueus*) more nearly. Perhaps they are nearest to *Priofinus*, which they resemble closely in coloration and with which genus the species have sometimes been confounded. In considering this genus we have noted that Coues observed that it was very close to *Puffinus*, and Mathews went so far as to lump it with *Procellaria*, noting it only differed in coloration. *Procellaria* is, so far as at present known, a Puffinoid form, but it is wholly black and does not show the supergeneric character of the peculiar coloration of the legs and feet. We now see that *Priofinus* does show this character, and that therefore it must be placed alongside *Ardenna*. Still, this does not help us with the affinities of the species, but only adds another problem.

Puffinus s. str. is homogeneous, and we trace it into *Reinholdia*, which differs in the very diminished tail, and into *Alphapuffinus*, which contains the smallest members of the group with small bills but average tails. We are here again at a loss as, unless we work through the species *cuneatus*, we cannot account for the dark long-tailed *Thyellodroma*. All the species of *Puffinus*, save *nativitatis* Streets, *Reinholdia* and *Alphapuffinus* are bicolor; while in *Thyellodroma*, *cuneata* and *bulleri* are bicolor, the former perhaps dimorphic, and *pacificus* unicolor. Contrasted with these

is the genus *Neonectris* with unicolorous, short-tailed forms, one weak-billed and the other strong-billed, and the genus *Hemipuffinus*, a heavy-billed bird, whose bill is abnormally unlike any other species in the supergenus.

The coloration of juveniles does not help us in this group as the downy young passes into the colour-feathering of the adult. Geographical distribution cannot be utilised at present, as we do not know where the birds breed with sufficient exactness to theorise at all.

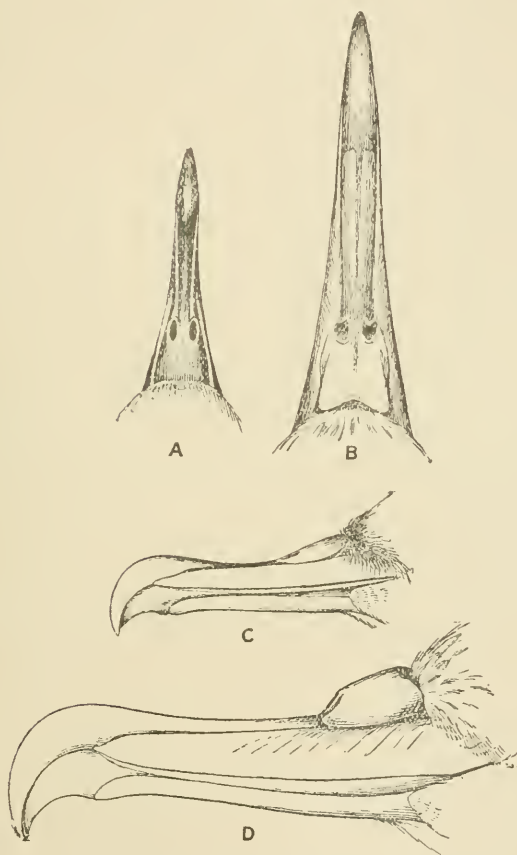
GENUS *CALONECTRIS*, nov.

We propose this genus-name for *Puffinus leucomelas* Temminck, which differs in coloration from every other member of the group. In its large size it comes near the genus *Ardenna*, and was placed under this genus by Mathews in his List of the Birds of Australia. Though agreeing fairly well in bill-characters with *Ardenna*, it differs in the structure of the legs and feet. *Ardenna* agrees, in having the tarsus very much compressed, with *Puffinus* sensu lat. *Calonectris* has the tarsus comparatively little compressed, and this feature is only shared with it by the species *kuhli*, which we temporarily associate with it. When it is recalled that of the twenty-five species included under the genus *Puffinus* in the 'Monograph of Petrels,' ranging from very large to quite small birds, twenty-three show the great lateral compression and only these two do not, it must be conceded that this is quite a valuable character. In the adult the bill differs obviously from that of *Puffinus* in the position and structure of the nasal tubes, and at once suggests *Procel-laria*. The relationship of that genus is, however, with *Ardenna* through *Prionofinus*, so that the bill formation becomes secondary to the feet formation.

In this connection the danger of genus lumping as regards anatomical study should be noted. Anatomists are notoriously careless of the nomenclature of the material they handle, and if any of the species of *Puffinus* (sensu latissimo) were handed to an anatomist for study, it would sooner or

later be utilised as typical of the genus. In the present case, the peculiar tarsal structure suggests coincident anatomical variation. Another peculiarity of the tarsus is

Text-figure 9.



- A. Top view of bill of *Puffinus bannermani*.
- C. Side view of ditto.
- B. Top view of bill of *Calonectris leucomelas*.
- D. Side view of ditto.

that it is shorter than the chord of the culmen, a feature not shared by any other Puffin-like birds, save *P. kuhli*. The more we study that species the more resemblances we

perceive to *C. leucomelas*, so that with our present knowledge it seems strictly congeneric. A further examination of *Priofinus* suggests that this is related to *kuhli* rather than *Ardena*, and that it would bear the same relation to *kuhli* as *Priocella* does to *Fulmarus*. If only nestlings were available we would be able to state definite relationships, whereas at present we can only suggest them, though we consider our suggestions are well-founded and will later prove correct.

Calonectris leucomelas.

Procellaria leucomelas Temminck and Laugier, Planch. Color. d'Ois, vol. v. livr. 99, pl. 587, 1835 : Seas of Japan.

Two specimens labelled :—

“Pescadores Is., May 1909. *Puffinus leucomelas* (Temm.).”

Measurements :—

Culmen 54, wing 326, tail 151, tarsus 51, mid-toe 58 mm.

„ 55, „ 327, „ 148, „ 51, „ 58 „

These are both adult breeding birds in good plumage; this would appear to be the first record of breeding birds, all the previous notes and specimens referring to sea-killed birds or migrants.

In coloration these birds agree well with the description given in the ‘Monograph,’ but not with the figure, which represents a different bird as is there stated; our birds, however, have the throat streaked as well as the malar region.

Genus PUFFINUS.

Puffinus Brisson, Ornith. vol. vi. 1760, p. 130.

Type (by tautonymy): *Procellaria puffinus* Brünnich.

To this genus, as restricted to birds agreeing with the type in the structure of the bill, legs and feet, and in general proportions, we have the pleasure of adding a new species.

Puffinus bannermani, sp. n.

Adult. General coloration above sooty-black, the head and neck bluish black washed with ashy, the hind neck noticeably so; the interscapular region shows feathers

having a broad lighter tip giving a scalloped appearance. The remiges and rectrices sooty-black, the inner webs of the primaries brown. A white streak under the eye. All the under surface from chin to under tail-coverts pure white : lores ashy ; under the eyes and sides of neck the feathers tipped with white, while there is a patch extending on to the sides of the breast, where the dark and white are about equal, having a mottled appearance. The shorter tail-coverts are white with brown spots near tips, while the longer ones are all black with scant white tips. All the edges of the under wing-coverts brown, succeeding row half white, centre pure white : *i. e.* the marginal coverts brown, the lower primary coverts and under secondary coverts pure white. Axillaries pure white. The bill is blue-black ; legs and feet distinctly particoloured in the typical puffinoid manner, judging by the dried skin.

Type. "North Iwojima, Bonin Is., Feb. 1910. *Estrelata longirostris* (Stejneger)" is the label with full data in Japanese.

Culmen 32, wing 214, tail 31, tarsus 42, mid-toe 40 mm.

Others measure :—

Culmen 31, wing 216·5, tail 79, tarsus 40, mid-toe 39·5 mm.

„ 31, „ 214, „ 80, „ 41, „ 40 „

This is a most interesting addition to the genus *Puffinus* s. str., its nearest relatives being *Puffinus newelli* Henshaw and *P. auricularis* Townsend, the correct name of which Mathews has shown to be *P. opisthomelas* Coues. It cannot be confused with either, though we know the former only from description and it is said now to be extinct or nearly so. It is separable at once from *P. newelli* in the difference of the coloration of the upper surface and the under tail-coverts, and from *P. opisthomelas* Coues (nec auct.) in the different upper coloration and size. It has the wholly white malar region of *P. newelli*, but the sides of the neck are mottled like *P. opisthomelas* Coues.

Mathews (Birds Austr. vol. ii. 1912, p. 67) wrote :—

"The acquisition of material from the Pacific points to the fact that *Procellaria obscura* Gmelin may after all have

been procured at Christmas Island, but I purpose to deal in detail with this most interesting collection at a later period when I have obtained more material. In this case we might have :—

- “*Puffinus obscurus obscurus* Gmelin. Christmas Island.
 „ „ *opisthomelas* Coues. Revillagigedo
 Group.
 „ „ *newelli* Henshaw. Sandwich Island.”

This was written when the first consignment with a solitary specimen of this bird was available. Study of the three specimens in connection with *P. opisthomelas* Coues and the description of *P. newelli* Henshaw suggests the absolute rejection of *P. obscurus* Gmelin until topotypes are available. We further do not feel inclined to consider the present form as subspecifically related to the others in view of the difference in general coloration, while the difference in size between *P. opisthomelas* Coues and *P. newelli* Henshaw is too great to treat them in this way, especially as they differ in the somewhat important character of the mottling of the side of the neck, to say nothing of the difference in the colouring of the malar region, under tail-coverts, etc.

Genus THYELLODROMA Stejneger.

Thyellodroma Stejneger, Proc. U. S. Nat. Mus. vol. xi. 1888, p. 93.

Type (by original designation) : *Procellaria pacifica* Gmelin.

The species-name *pacifica* is almost characteristic of this genus, as it would appear to be confined to the Indo-Pacific Oceans and not to range into the Atlantic. *Hemipuffinus* has also a restricted range, while *Reinholdia* is only very locally known at present.

We have placed the species *nativitatis* under *Puffinus*, but it may be that it should be placed in conjunction with this genus; wherever it is classed it is quite an aberrant form. Probably the wisest course would be to designate it with a

new subgeneric name and thus attract attention to it. We would therefore propose

Sub-genus *MICROZALIAS*, nov.

for *Puffinus nativitatis* Streets.

The genus *Thyellodroma* is composed of bicolor and unicolor species, and these are large, but not the largest, puffinoid birds with long wedge-tails. Whether there are two or three species is not yet decided, and though Mathews regarded two only as specifically distinct, we here revert to the treatment in the 'Monograph,' where three were admitted.

The genus covers the only case in the puffinoid group where dimorphism or interbreeding is suggested, and probably later information will once more radically change our conclusions.

Thyellodroma cuneata cuneata (Salvin).

Puffinus cuneatus Salvin, Ibis, 1888, p. 353; Krusenstern Island, Marshall Group.

This species was described from a couple of skins from the Marshall Group, and the further history of its discovery is retailed in the 'Monograph,' p. 76. In the 'Birds of Australia,' vol. i. 1912, pp. 82-84, Mathews discussed the phases and lumped all the birds previously named *Puffinus cuneatus* under *Puffinus pacificus*, distinguishing several subspecies. In the present collection six specimens occur, and a re-investigation of the group was necessary. We now differentiate two species, *T. cuneata* and *T. pacifica*, and note that the subspecies as regards general coloration are constant save in two localities.

An example from Owston's collection is labelled as follows:—

"Bonin Is., May 1910. *Puffinus cuneatus* Salv."

Culmen 41, wing 280, tail 137·5, tarsus 47, mid-toe 48 mm.

General coloration above brownish; below pure white with a slight freckling of grey on sides of body; under tail-coverts brown. Compared with the type of *Puffinus cuneatus*

Salvin there is practically no difference to be observed, the latter having the head slightly darker as also the wing-coverts, but this may be due to age ; there is slightly more freckling on the sides of the breast, and the axillaries are darker and the under wing-coverts more splashed with grey. The measurements of Salvin's type are :—Culmen 42, wing 300, tail 135, tarsus 49, mid-toe 50 mm.

The Bonin Island bird in the skin has the bill light horn, the tip darker, while the legs and feet are dirty-yellow, almost uniform, but slightly darker on the outside.

Another specimen is labelled :—"Iwojima, Bonin Island, 15th July, 1911. *Puffinus tenuirostris* Temm."

Culmen 39, wing 294, tail 137.5, tarsus 49, mid-toe 52 mm.

This example agrees even more closely than the preceding with the type of *Puffinus cuneatus* Salvin.

A third labelled "Iwojima, Bonin Island, 15/7/11, ♂ *Puffinus tenuirostris*," has the culmen 41, wing 296, tail 135, tarsus 47, mid-toe 52 mm., and is very similar to the others, but has less freckling of grey on the sides of the body, an almost pure white under-wing and grey axillaries with white tips.

These two have very pale legs, scarcely darker on the outside of the tarsus, while the outer toe shows distinct dark spots on the joints, otherwise little difference in colour.

One labelled "Iwojima, Bonin Is., Aug. 1910, *Puffinus tenuirostris* (Temm.)" is a most interesting specimen as it is a fully-grown immature bird. It measures : culmen 41, wing 280, tail 131, tarsus 47, mid-toe 50 mm. The upper coloration is of a greyer tinge throughout, and the feathers of the upper back and under wing-coverts have broadish white tips ; all the under parts are faintly but fairly regularly freckled with ashy ; the under-wings are white with ashy markings predominating, the shafts of many feathers dark ; the axillaries are dark ashy splashed with lighter ashy ; the bill is dark horn throughout, and the legs and feet are pallid, the outside faintly darker.

An example marked "Muko Is., of Bonin Group, 5/11/1911, *Puffinus leucomelas* (Temm.)," is a young in down ; the forehead bare of down, showing greyish brown

as in the preceding specimen, and chin whitish with ashy freckling and the breast regularly freckled ; all the rest of the under-surface down-covered save the under tail-coverts, which have whitish tips showing ; the down is ashy, and of a paler shade in the centre of the abdomen ; the back and wing-coverts are exactly of the same colour as the above-mentioned bird with similar broad white tips ; wings very short and dark ; feet showing dark edges and joints ; the bill long and very thin, sides dark yellow-horn, rest very dark ; nostrils distinctly on each side of culmen ridge, which is clearly separated from the laterals. Chord of culmen 39.5 mm.

An example from "Pescadores Island, 15th May, 1909, *Puffinus cuneatus*," has the culmen 39, wing 287, tail 136, tarsus 148, mid-toe 50 mm. It agrees very closely with the first-mentioned specimens.

In the British Museum is a specimen with the data "♀, 5th June, 1890, P. A. Holst, Sulphur I., Bonins," and the soft parts are given in detail thus : "Bill light grey, except upper part from groove and hooked tip black, also upper part (edges) and hook of lower mandible black. Tarsi and feet whitish pink, somewhat dusky at the joints on the outer side. Irides faint brown."

This series is practically typical, and it is noteworthy that no dark birds occur. The downy young with the freckled under surface and the fully grown immature show the same feature, while all the adults are pure white below : this is very interesting, but gives no clue to the dimorphism apparently found on San Benedicto Island, but suggests further inquiry at that place. It might be observed that the Bonin Island form has a very slender tarsus. We would again emphasize our ignorance of Pacific Ocean breeding Petrels by stating that no white-breasted "*cuneata*" is known from the south Pacific Ocean, but a white-breasted species called *Puffinus bulleri* Salvin is rarely known from New Zealand waters, its breeding place being unknown. A similar form has recently occurred off the Californian coast, but its breeding-place is also unknown. The New

Zealand bird does not wander to California: such a statement would seem absurd. All birds from the Indian Ocean, western and eastern Australia, and southern Pacific are uniformly dark. From Laysan comes a white-bellied form with a few uniform birds intermingled, while on San Benedicto Island, off the Mexican coast, a uniform bird occurs with a light-breasted one, the dark bird predominating. From the Pescadores Islands a single light-breasted bird has been received, almost certainly a breeding individual, and it is very probable that only white-breasted birds of this group occur on the Islands, as dark birds received prove to belong to *Neonectris griseus* (Gmelin) subsp.

The apparent variation in coloration observed at San Benedicto Island and Laysan is quite unparalleled in this family, and is more puzzling than in the case of *Estrelata neglecta* Schlegel, with whose phases one of us is very familiar. In that case we have a variable species at three or four different localities with nothing very similar otherwise known. In the present case we have two very distinct species, quite constant, found in many localities, and then a commingling of the two on one or two groups of islands in different ratios. This strongly suggests hybridism and the separation of the two as distinct species. Adopting this view we would therefore restrict *Puffinus pacificus allenii* Mathews (Birds Austr. vol. ii. 1912, p. 83) to the dark bird, and note the forms of *T. cuneata* as follows:—

Thyellodroma cuneata cuneata Salvin.

Marshall group, Vulcan group, Bonin Island,
Pescadores Islands.

T. c. laysani Mathews. Laysan, Hawaiian Group.

T. c. subsp. San Benedicto Island, Mexico.

Genus NEONECTRIS.

Neonectris Mathews, Austral Av. Rec. vol. ii. 1913, p. 12.

Type (by original designation): *Puffinus brevicaudus* Gould.

This name was proposed by Mathews as the names used

previously for this genus all proved untenable. It differs from the preceding genus in its short tail, though agreeing in its dark coloration throughout. That it should be generically separated rather than subgenerically is a point upon which we anticipate criticism, mainly from workers who glance at the small superficial differences, without considering the lessons to be deduced from such small discrepancies.

We have indicated that *Thyellodroma* has a distribution confined to the Indo-Pacific Oceans. It is found breeding probably throughout the tropical and temperate Pacific Ocean, north and south of the Equator, and in the Indian Ocean among the Mascarene Islands and West Australia.

Neonectris breeds in southern-east Australia and south New Zealand, in both cases in more southerly regions than species of *Thyellodroma*. It occurs abundantly in southern South America, suggesting a southern breeding-place: it has occurred in the north Atlantic as a straggler, and has always been thought to breed only in the southern Hemisphere. It ranges along eastern North America, and these birds were also relegated to southern breeding-places.

Mathews (Birds Austr. vol. ii. 1913, p. 103) was probably the first to suggest that this conclusion was incorrect, as though Stejneger had previously noted that the birds found on the Commander Islands were "probably breeding," he laid no stress upon this, and his statement was consequently ignored.

We now record breeding birds from the north Pacific Ocean, and emphasize the fact that all statements as to northern birds breeding in the south are mere unconfirmed suggestions and with the present knowledge worthless.

The fact that *Neonectris* breeds in the north Pacific Ocean and the south Pacific Ocean, while *Thyellodroma* breeds in the mid-Pacific Ocean, leads us to give generic value to the slight difference which can hardly be superficially observed. Though *Thyellodroma* and *Neonectris* are apparently so alike, in life they present different appearances,

so that they can be recognised at sight: their habits are different, and their notes differ essentially so that even in the dark they can be distinguished.

Neonectris griseus pescadorei, subsp. n.

Two specimens, labelled "Pescadores Is., May 1909, *Puffinus carneipes* Gould," are the first record of this species from the western Pacific Ocean and also the first record of the species as a breeding bird north of the Equator. These two birds were taken from breeding-burrows, and have the base of the bill somewhat denuded of feathers through digging. The fact that Owston labelled them "*Puffinus carneipes*" indicates the nature of the bill, as that species has a heavy bill and flesh-coloured legs: these specimens have not flesh-coloured legs but have stout bills, which characterise the subspecies.

The birds are brownish above, the head black; there are brownish tips to the scapulars and greater wing-coverts; chin ashy; under surface ashy brown, paler on the breast; axillaries brown; the under-wing feathers ashy with dark shafts. There is practically no difference whatever in the two specimens, the paler breast being rather more pronounced in one bird, which has also the under wing-coverts lighter.

Measurements :—

Culmen 42, wing 292, tail 86, tarsus 55, mid-toe 54 mm.

(Type of the species.)

Culmen 43, wing 291, tail 96, tarsus 56, mid-toe 56 mm.

The type-locality of *Neonectris griseus* (Gmelin) is New Zealand, where in the extreme south it is an extremely abundant breeder. One of the writers has seen them in countless numbers passing to the breeding-ground so often written about. Neozelanic specimens show little difference in the measurements save in the bill, which is short and more slender, an average example measuring :—Culmen 39, wing 290, tail 87, tarsus 56, mid-toe 54 mm.

Neonectris griseus missus, subsp. n.

Two specimens, labelled "Kuril Island, *Puffinus griseus* (Gmelin)," differ at sight from the preceding in their different coloration, being purer ashy throughout, lacking the brown coloration so noticeable in the form above described. We at first thought these might be more freshly plumaged birds, but we note that the base of the bill is also denuded of feathers, indicating digging and breeding birds. As the difference in coloration is also accompanied by a slight variation in the bill measurement, as given below, we have to differentiate the form by name.

The under-wing coloration varies, one being more ashy, the other more white, otherwise the two birds are very similar in every way. They measure:—

Culmen 44, wing 296, tail 86, tarsus 57, mid-toe 53 mm.
(Type of the species.)

Culmen 45, wing 301, tail 87, tarsus 57, mid-toe 55 mm.

In this race the bill is longer than in the preceding, but it is proportionately more slender.

Mathews (Birds Austr. vol. ii. 1912, p. 98) wrote:—"This name (*chilensis* Bonaparte) must be accepted at the present time in preference of *N. amaurosoma* Coues, though later this latter name may have to be used for a north Pacific breeding form, the types of Coues's species having been obtained at Cape St. Lucas, Lower California. I am not at all certain that the birds met with in such numbers at the extremity of South America are the same as those which occur off the coast of California. There always seem to be discrepancies in the dates that need adjustment, and the recent discoveries of Petrels breeding in the north Pacific seem to point to many yet to be made."

Examination of the specimens available of *N. griseus* suggests confirmation of this statement, as Monterey birds all agree in having longer bills, legs, and toes than Chilean specimens. From the fact that *N. griseus* breeds on the Pescadores Islands, it would be almost a certain guess that a form breeds somewhere off western North America

which is quite distinct from the bird breeding in southern South America.

It should be observed that instead of "*P.*" *carneipes* and "*P.*" *tenuirostris*, the two anticipated breeding "*Puffinus*" in Japanese seas, Owston sent two forms of "*P.*" *griseus*, a new bird for the locality in every sense. What else may still be hidden?

Genus COOKILARIA.

Cookilaria Bonaparte, Comptes Rendus Acad. Sci. Paris, vol. xliii. 1856, p. 994.

Type (by original designation) : *Procellaria cookii* Gray.

In the 'Birds of Australia,' vol. ii. 1912, pp. 129-132, Mathews showed that *Pterodroma* must be used instead of *Æstrelata* on the score of priority, if the association of species brought together in the 'Monograph' be maintained.

Later, in the 'Ibis,' 1913, p. 233, the present writers differentiated the genus *Cookilaria* for the type species, leaving all the rest in the genus *Pterodroma*. The group is very difficult to segregate, as Cones experienced; but it is just as certainly *polyphyletic*. At present the one fact certain is that *Cookilaria* is easily recognisable.

Mathews (*loc. cit.* p. 168) wrote :—

"The group of small Petrels ranged round *Pterodroma cookii* is well marked, and the subspecies are easily recognisable. At present the subspecies known are ;—

<i>Pterodroma cookii cookii</i> Gray.	New Zealand.
„ „ <i>leucoptera</i> Gould.	East Australia.
„ „ <i>nigripennis</i> Rothschild.	Kermadec Group.
„ „ <i>axillaris</i> Salvin.	Chatham Islands, New Zealand.
„ „ <i>defilippiana</i> Gigl. & Salvad.	Western South America.
„ „ <i>longirostris</i> Stejneger.	Japanese Isles.

The receipt of specimens of *Æstrelata hypoleuca* Salvin (Ibis, 1888, p. 359, Krusenstern Is.) shows this species

to belong to *Cookilaria*, though in the 'Monograph' it was associated with *mollis* and *torquata*, with which it was compared when described many years previously."

The characters of the forms are so slight that subspecific value seems most suitable, but upon close examination we find the differences so peculiarly ranged that we are perhaps dealing with species. Thus, while all are certainly very closely allied and congeneric, the two forms most exactly alike as to upper coloration, viz., *nigripennis* and *defilippiana*, have very differently coloured primaries. This would be less remarkable were it not that another couple almost exactly agreeing in upper coloration, viz., *leucoptera* and *hypoleuca*, differ in the same respect. The two pairs differ very decidedly, the former being the palest, the latter the darkest of the series.

The two forms that have dark primaries, viz., *hypoleuca* and *nigripennis*, are the darkest and lightest of the lot; while the two darkest, viz. *leucoptera* and *hypoleuca*, and the two lightest, viz. *defilippiana* and *nigripennis*, differ most in the coloration of the primaries. Species of *Cookilaria* have different habits, flight, and notes from species of *Pterodroma* or *Æstrelata*, and can be recognised at sight or in the dark. *Pterodroma* and *Æstrelata* are difficult to separate, as so little is known about the species at present. At the Kermadec Islands three species of the genus *Pterodroma* sensu lato breed together, viz. *P. cervicalis* Salvin, *P. neglecta* Schlegel, and *P. nigripennis* Rothschild. If it were true of this group that no two birds of the same genus breed together, then we would know that *P. cervicalis* Salvin and *P. neglecta* Schlegel should be referred to different genera. As a matter of fact, though these two birds differ very little in structure or coloration, so that from skins it might seem impossible to allot them to different genera, the birds are very different in nature, having dissimilar habits (*P. neglecta* breeding above ground, *P. cervicalis* in burrows) and very distinct notes. The downy young of *P. cervicalis* is like a macromorph of that of *P. nigripennis*, and differs in down colour-pattern from the

young of *P. neglecta*. In coloration *P. cervicalis* is absolutely constant, while *P. neglecta* shows remarkable variation in coloration. Again, the egg-shell of *P. cervicalis* is peculiar when contrasted with that of *P. neglecta*. Such details may not impress the genus-lumper, but it is as well that they should be recorded in this connection with the suggestion that *P. cervicalis* and *P. neglecta* are representatives of distinct genera. We have already noted that *Cookilaria* is very distinct in all the above factors.

Cookilaria cookii hypoleuca.

Æstrelata hypoleuca Salvin, Ibis, 1888, p. 359: Krusenstern Island, Marshall Group.

"North Iwojima, Bonin Is., February 1910. *Æstrelata hypoleuca* Salv." Full data in Japanese.

Culmen 26, wing 230, tail 120, tarsus 32, mid-toe 32 mm.

Differs from the type of *Æ. hypoleuca* Salvin, which measures: culmen 26, wing 228, tail 120, tarsus 29, mid-toe 29 mm., only in having the feathers of the rump darker.

"Sagalien Is., April 1909. *Æstrelata hypoleuca* Salv." Also data in Japanese.

Culmen 25.5, wing 236, tail 114, tarsus 30, mid-toe 30 mm. Agrees absolutely with the preceding.

These are practically typical specimens, so that it is almost certain that the Sandwich Island birds require a new name: no form of this genus is known to inhabit different localities, those from east Australia, Kermadec Islands, New Zealand, and Chatham Islands respectively being all well characterised.

GENUS BULWERIA.

Bulweria Bonaparte, Nuov. Annal. Sci. Nat. Bologna, vol. viii, for 1842, Jan. 1843, p. 426.

Type (by monotypy): *Procellaria bulweri* Jardine & Selby.

So much has been written about this very distinct genus that we can add nothing. In the 'Monograph' it is placed after *Pagodroma nivea* (Gmelin), as anatomical study has proved it to be very aberrant in some features considered

of importance. The formation of the bill and skull recall *Pagodroma* to us, and the opposition of coloration is very remarkable if these two should prove closely allied. It seems, as does *Pagodroma*, to be related to *Pterodroma* more nearly than to any other genus.

Bulweria bulweri pacifica, subsp. n.

Type, labelled "Iwojima, Bonin I. ♂, 15/7/11. *Bulweria bulweri*."

Culmen 23, wing 210, tail 119, tarsus 27·5, mid-toe 27·5 mm.

We separate the Pacific-breeding Bulwer's Petrel on account of its stronger bill, no other difference being apparent: the coloration agrees very closely with Atlantic specimens, and there is very little variation in size. Two other birds received measure:—

"Iwojima, Bonin Is. ♂, 15/7/11. *Bulweria bulweri*."

Culmen 23, wing 206, tail 105, tarsus 27, mid-toe 27 mm.

"Iwojima, Bonin Is. ♀, 15/7/11. *Bulweria bulweri*."

Culmen 22·5, wing 206, tail 109·5, tarsus 27, mid-toe 27 mm.

We made our comparisons with specimens from Madeira, the type-locality of *P. bulweri* Jardine & Selby, and noted that Atlantic Island birds generally agreed with these, while other Bonin Island birds and birds from Foochow, China, agreed with our Pacific birds. We now note that in the 'Ibis,' 1914, p. 268, Bannerman gives measurements of Canary Island series thus:

22 males—Culmen 20·5–23, wing 187–205 (average 196·5), tarsus 25·5–28 mm.

4 females—Culmen 20·5–21, wing 191–200 (average 195·5), tarsus 26·5–27·5 mm.

It will be noticed that our three specimens are all larger in the culmen and wing than the Canary Island birds. Bannerman, in the 'Ibis,' 1914, pp. 488–494, remarks on the discontinuous distribution of this species, occurring in the eastern Atlantic and then recurring in the north Pacific, and comments upon it. The most peculiar fact, however,

to us, is the difficulty in separating these breeding colonies subspecifically, while from the Fiji group in the middle Pacific a distinct species of *Bulweria* is known.

GENERAL REMARKS.

The imperfection of our knowledge of the breeding places of Petrels is emphasized by the preceding collection. The recognition of a breeding form of *Neonectris griseus* (Gmelin) on the Pescadores Islands is quite a novel fact. We were confident that breeding places of "*P.*" *tenuirostris*, *carneipes*, and *griseus* would be found in the north Pacific Ocean, but we would have suggested for the *griseus* form a far north breeding place as it is the furthest southern breeding "*Puffinus*."

The acquisition of an entirely new species of *Puffinus* was much less unexpected, but it is none the less welcome, while a new species of *Cymochorea* was not anticipated. We might draw attention to the treatment of "*Oceanodroma hornbyi* (Gray)" by the American Ornithologists' Union. In the Check-List, 3rd ed. 1910, p. 370, it has been placed on the Hypothetical List, as since it was described in 1854 from the north-west coast of America it has not been again met with. In the Birds Austr. vol. ii. 1912, p. 141 *et seq.*, under the name *Pterodroma melanopus*, is detailed the history of a bird which was described in 1844 and was not rediscovered until 1911, yet it is a common bird at the new locality, which is not inaccessible to visitors. We further note that in 1884 Baird, Brewer, and Ridgway (Water Birds N. Amer. vol. ii. p. 411) commented on *Cymochorea melania* (Bonaparte) thus:—"That it should not since (1854) have been met with is a strong indication that it does not belong to our fauna." The breeding-place of this bird is now known, so that of *O. hornbyi* (Gray) may be just as near. If this bird were re-transferred to the Check-List proper, we think it would become a source of greater interest and research than it is while retained in its present position. We have thus digressed to emphasize our views once more that forms of *Puffinus tenuirostris*, *griseus*, and *bulleri* will all be found breeding off the west

coast of North America, and suggest that the islands off the coast north of Vancouver to Alaska may hide these and other breeding forms.

As this paper deals only with Petrels we may perhaps be allowed to add a note of interest foreign to the preceding. We would like to point out that the names proposed by us are arbitrary combinations of letters without any meaning whatever, unless we definitely give such. We consider it often impossible to guess the meaning of a word, and we would here cite the curious case of *Daption*. Stephens gave this name to a genus of Petrels and many workers have studied Greek dictionaries, attempting to extort a meaning. *Daptrion*, *Daptium* and *Daptes* have been suggested, the last mentioned now appearing as the meaning in the recent B. O. U. List of British Birds. It has recently occurred to us that *Daption* is simply an anagram or metathesis of *Pintado*, a seamen's name for the bird, and that our predecessors' labours for a derivation from the Greek have been in vain.

XXVIII. — *Studies on the Charadriiformes*. — I. *On the Systematic Position of the Ruff* (*Machetes pugnax*) and the *Semipalmated Sandpiper* (*Ereunetes pusillus*), together with a Review of some Osteological characters which differentiate the *Erolia* (*Dunlin group*) from the *Tringa* (*Redshank group*). By PERCY R. LOWE, M.B., M.B.O.U.
(Text-figures 10 & 11.)

IN the British Museum Catalogue of Birds (vol. xxiv.) ; in the British Museum Hand-list of Birds ; in Seebohm's 'Geographical Distribution of the Charadriidæ' ; in the recent 'B. O. U. List of British Birds,' 1915, and in fact, so far as I am aware, in every systematic treatise or book in which a distinction is made between the subfamilies *Tringina* (*Totantina olim*) and *Erolia* (*Tringina olim*), the Ruff is included in the subfamily *Tringina* or the Redshank group of Waders, as opposed to the *Erolia* or the Dunlin association.

In some works, such as the A. O. U. Check-List of North American Birds, no distinction is drawn between these two